



UNVEILING THE SYNERGISTIC BEAUTY OF MARIGOLD AND DRAGON FRUIT: A REVIEW

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ABSTRACT:

This review explores the synergistic potential of marigold and dragon fruit in enhancing health and beauty applications. Marigold, known for its rich content of lutein and zeaxanthin, offers anti-inflammatory and antioxidant benefits, while dragon fruit provides essential vitamins and antioxidants with potential skin rejuvenating effects. By synthesizing current research, this review aims to elucidate how the combined use of these two botanicals can amplify their individual benefits, potentially leading to novel cosmetic and therapeutic applications. Additionally, the review examines their traditional uses, bioactive compounds, and mechanisms of action, providing a comprehensive overview of their potential synergistic effects. This analysis highlights future research directions and practical implications, offering insights into the development of innovative beauty and wellness products. Furthermore, the review addresses potential challenges and limitations in integrating marigold and dragon fruit into commercial formulations, including stability, bioavailability, and regulatory considerations. By identifying gaps in current knowledge, this review aims to guide future studies and industry efforts in harnessing the full potential of these natural ingredients. Through a holistic approach, it seeks to contribute to the advancement of sustainable and effective beauty solutions that leverage the unique properties of marigold and dragon fruit.

Keywords: Marigold, Dragon Fruit, Synergistic Effects, Antioxidant Activity, Anti-inflammatory Activity, Herbal Medicine.

INTRODUCTION:

Aging refers to the process of growing older, primarily applied to humans, many animals, and fungi. However, certain organisms, such as bacteria, perennial plants, and some simple animals, can potentially avoid biological aging. In a broader context, aging can also describe the phenomenon where individual cells stop dividing or pertain to the aging of a species as a whole. Skincare products marketed as anti-aging are often moisturizer-based and come with claims sometimes lacking scientific proof promising to make users appear younger by reducing, concealing, or preventing visible signs of skin aging. Aging is influenced by environmental and lifestyle factors. Premature aging often manifests on the skin through wrinkles, age spots, dryness, or a loss of skin tone.¹ Adopting healthy lifestyle habits can help prevent and mitigate further premature aging. Marigold extract is renowned for its rejuvenating and brightening properties, enriched with flavonoids and carotenoids that act as powerful antioxidants, protecting the skin from oxidative damage and promoting cell regeneration.

Additionally, it contains terpenoids that enhance collagen production and improve skin elasticity. Neem, known for its antibacterial, anti-inflammatory, and antioxidant properties, helps reduce scars, pigmentation, redness, and itching.²

Dragon fruit, a vine cactus species from the Cactaceae family, is noted for its distinctive and exotic appearance³. Increasingly popular for its nutritional and medicinal benefits⁴, dragon fruit is recognized as a significant economic fruit globally due to its valuable nutritional content. Dragonfruit holds considerable promise as a new crop for Mediterranean growers because it requires minimal water and is well-adapted to high temperatures⁵.

BOTANICAL OVERVIEW

1. Marigold :

The plant common names are: French marigold [England], Tudentenblume [German], Amapola amarilla [Spanish], Clavel De Los Muertos, Copetes [Spanish], Copetillo [Spanish], Copada, Flewurs Souci, Dwarf, Garden Marigold, Jafari, Qadifah, and Souci (USDA, 2008). The French marigold is native to Mexico, and Nicaragua. In addition, it has been cultivated in Europe, Iraq, India, China, Argentina, and Colombia, and in The United States for its medicinal properties and as a flowering ornamental Plant⁶⁶.

The flowers of marigold plant were collected during April season from Medicinal plants garden of pharmacognosy department of college of pharmacy/Almustansiriyah University. The flowers were cleaned and dried at room Temperature in the shade for about 10 days.

• **Scientific name :** *Tagetes erecta*

• **Kingdom:** Plantae

• **Clade:** Asterids

• **Order:** Asterales

• **Family:** Asteraceae

• **Subfamily:** Asteroideae

• **Tribe:** Tageteae

• **Subtribe:** Pectidinae

• **Genus:** *Tagetes*



(figure no:1)⁴⁶

Chemical And Reagents:

For marigold, ethanol, methanol, and acetone are commonly employed solvents for extracting flavonoids, carotenoids, and essential oils. Distilled water is also used for aqueous extractions⁷⁷. Analytical reagents such as hydrochloric acid (HCl) and sodium hydroxide (NaOH) are used for pH adjustments and saponification processes⁸. Ferric chloride (FeCl) and aluminium chloride (AlCl)

assist in detecting phenolic compounds and flavonoids, respectively⁹. Dimethyl sulfoxide (DMSO) may be used as a solvent in some extractions. Additionally, the Folin-Ciocalteu reagent is utilized to determine total phenolic content, while DPPH is employed for assessing antioxidant activity¹⁰. Thin-layer chromatography (TLC) and silica gel are used for separating and analyzing specific compounds¹¹.

2. Dragon Fruit:

Common Names: Dragon fruit is known by several names depending on the region, including Pitaya, Pitahaya, and in some locales, it may be referred to as Dragon Fruit or Pitaya Fruit¹².

- **Scientific Name:** Selenicereus undatus
- **Kingdom:** Plantae
- **Clade:** Angiosperms
- **Order:** Caryophyllales
- **Family:** Cactaceae
- **Genus:** Selenicereus



(Figure no:2)⁴⁷

Origin and Cultivation: Dragon fruit is native to Central America, particularly Mexico, and has been widely cultivated in various regions including Vietnam, Thailand, the Philippines, and Israel¹³. It is also increasingly grown in Mediterranean countries due to its adaptability to high temperatures and minimal water requirements¹⁴. In the United States, it is cultivated in warm climates such as Florida and California¹⁵.

Harvesting and Processing: Dragon fruit is typically harvested when ripe, characterized by its vibrant color and slightly soft texture. The fruit is often collected from the plant by hand and can be eaten fresh, used in cooking, or processed for various food products and beverages. The fruit's vivid exterior and unique appearance make it popular not only for its flavor but also for its ornamental value¹⁶.

Chemical And Reagents:

For dragon fruit, ethanol, methanol, and acetone are also used for extracting nutrients, antioxidants, and phytochemicals. Distilled water is commonly used in aqueous extractions. Analytical procedures often involve hydrochloric acid (HCl) and sodium hydroxide (NaOH) for pH adjustments and hydrolysis¹⁷. Ascorbic acid is used to measure vitamin C content, and phenol can be utilized in some

antioxidant assays¹⁸. The Folin-Ciocalteu reagent is similarly used for phenolic content analysis, while DPPH is used for evaluating antioxidant activity. High-Performance Liquid Chromatography (HPLC) and its solvents, such as methanol and acetonitrile, are employed for detailed analysis of vitamins and other compounds. These chemicals and reagents are essential for the effective extraction and analysis of phytochemical constituents in both marigold and dragon fruit¹⁹.

Benefits of Marigold

• Anti-inflammatory Effects: Mechanisms and Relevance to Skincare

Marigold (*Tagetes erecta*) is renowned for its potent anti-inflammatory properties, which are largely attributed to its rich content of flavonoids and carotenoids. These compounds inhibit the production of pro-inflammatory cytokines and enzymes such as cyclooxygenase (COX) and lipoxygenase (LOX)²⁰. By reducing inflammation at the cellular level, marigold helps to calm irritated skin, alleviate redness, and minimize swelling. In skincare, these anti-inflammatory effects are particularly valuable for treating conditions like acne, eczema, and rosacea, where inflammation plays a central role in symptom manifestation²¹. The application of marigold extracts in creams and ointments can thus provide relief and improve the overall appearance of inflamed skin²².

• Anti-oxidant Properties: How It Combats Oxidative Stress and Aging

Marigold's antioxidant properties are primarily due to its high concentrations of flavonoids, carotenoids, and essential oils. These antioxidants neutralize free radicals—unstable molecules that cause oxidative stress²³, leading to cellular damage and accelerated skin aging. By scavenging free radicals, marigold extracts help protect skin cells from oxidative damage, thereby reducing the formation of wrinkles, fine lines, and age spots. The antioxidants in marigold also support the skin's natural repair processes and maintain its youthful appearance. Incorporating marigold into skincare products helps to counteract environmental stressors such as UV radiation and pollution, further contributing to the skin's overall health and longevity²⁴.

• Skin Healing and Repair: Evidence of Effectiveness in Treating Skin Conditions

Marigold has been widely recognized for its skin healing and repair properties, supported by both traditional use and scientific research. The plant's compounds, including flavonoids and terpenoids, promote cell regeneration and tissue repair²⁵. Studies have demonstrated that marigold extracts accelerate the healing of wounds, reduce scarring, and enhance skin barrier function. These effects are beneficial for treating various skin conditions such as minor cuts, abrasions, and irritations. Marigold's ability to stimulate collagen production and improve skin elasticity also contributes to its efficacy in repairing damaged skin and improving its texture. Consequently, marigold is a valuable ingredient in topical formulations aimed at supporting skin recovery and enhancing overall skin health²⁶.

Benefits of Dragon Fruit

• Nutritional Value: Impact of Vitamins and Minerals on Skin Health

Dragon fruit is rich in essential vitamins and minerals that contribute significantly to skin health. Key nutrients include vitamin C, which is crucial for collagen synthesis and helps maintain skin firmness and elasticity. Vitamin C also has antioxidant properties that protect skin cells from damage caused by free radicals and environmental stressors. Additionally, dragon fruit provides B vitamins, such as B1 (thiamine), B2 (riboflavin), and B3 (niacin), which support overall skin health by promoting cell metabolism, enhancing moisture retention, and improving skin texture²⁷. The fruit is also a good source of minerals like magnesium and zinc, which are important for maintaining healthy skin, reducing inflammation, and aiding in the repair of skin tissues²⁸.

• Antioxidant Effects: Role in Reducing Free Radical Damage

Dragon fruit contains potent antioxidants, including vitamin C, betalains, and carotenoids, which play a crucial role in mitigating oxidative stress. These antioxidants neutralize free radicals, unstable

molecules that can damage skin cells and accelerate aging processes such as the formation of wrinkles and fine lines. By reducing oxidative damage, dragon fruit helps protect the skin from premature aging and maintains a youthful appearance²⁹. Regular application or consumption of dragon fruit can enhance the skin's natural defense mechanisms, reducing the visible signs of aging and promoting a healthier complexion³⁰.

• **Hydration and Rejuvenation: Effects on Skin Hydration and Elasticity**

Dragon fruit is known for its high water content and hydrating properties, which are beneficial for maintaining optimal skin moisture levels³¹. The fruit's natural hydration helps to plump the skin, improving its elasticity and reducing the appearance of fine lines and wrinkles. Moreover, dragon fruit's ability to retain moisture supports the skin's overall suppleness and smoothness. The presence of essential fatty acids in the fruit also aids in restoring the skin's natural lipid barrier, further enhancing its ability to retain moisture. This combination of hydration and rejuvenation makes dragon fruit an effective ingredient in skincare products designed to refresh and revitalize the skin, contributing to a more radiant and youthful appearance³².

SYNERGISTIC EFFECTS OF MARIGOLD AND DRAGON FRUIT

Mechanisms of Synergy

• **Complementary Phytochemicals: How Compounds from Both Botanicals Work Together**

Marigold (*Tagetes erecta*) and dragon fruit offer a range of phytochemicals that, when combined, can enhance their individual effects on skin health. Marigold is rich in flavonoids, carotenoids, and essential oils, which provide anti-inflammatory, antioxidant, and skin-healing properties. Flavonoids and carotenoids in marigold work synergistically to reduce oxidative stress and inflammation, while essential oils contribute to antimicrobial effects and improve skin texture³³.

Dragon fruit, on the other hand, is abundant in vitamin C, betalains, and carotenoids. Vitamin C is a powerful antioxidant that promotes collagen synthesis, enhancing skin firmness and elasticity. Betalains and carotenoids also have antioxidant properties that help neutralize free radicals and protect the skin from damage. The combination of these compounds with those found in marigold can create a potent blend that maximizes antioxidant protection, reduces inflammation more effectively, and accelerates skin regeneration³⁴.

When used together, the phytochemicals from both botanicals can provide a multi-faceted approach to skincare. For example, while marigold's anti-inflammatory compounds soothe and reduce redness, dragon fruit's vitamin C content supports collagen production and skin hydration. This complementary action enhances the overall efficacy of the skincare formulation, addressing multiple aspects of skin health simultaneously³⁵.

• **Enhanced Bioavailability: Potential for Improved Absorption and Efficacy**

The synergy between marigold and dragon fruit may also lead to improved bioavailability of their active compounds. Bioavailability refers to the extent and rate at which active ingredients are absorbed and utilized by the skin. The combination of these botanicals can enhance the stability and solubility of their phytochemicals, potentially leading to better absorption and efficacy³⁶.

For instance, the presence of fatty acids and polysaccharides in dragon fruit can aid in the delivery of marigold's lipophilic compounds (such as certain carotenoids) into the deeper layers of the skin³⁷. Conversely, the antioxidant properties of marigold might protect dragon fruit's vitamin C from degradation, ensuring that it remains active and effective longer. This enhanced bioavailability ensures that the therapeutic benefits of both botanicals are fully realized, offering a more effective skincare solution³⁸.

COMBINED APPLICATIONS

• **Cosmetic Formulations: Examples of Products That Combine These Ingredients***

The synergistic effects of marigold and dragon fruit are being increasingly harnessed in various

cosmetic formulations. For example, facial creams and serums often combine these ingredients to leverage their complementary benefits. Products such as anti-aging creams and hydrating serums might feature both marigold extract and dragon fruit to target multiple skin concerns. Marigold's anti-inflammatory properties help soothe irritated skin and reduce redness³⁹, while dragon fruit's high vitamin C content boosts collagen production and improves skin hydration⁴⁰.

An example of such a formulation is a rejuvenating night cream that uses marigold extract for its skin-healing properties and dragon fruit for its hydrating and antioxidant benefits⁴¹. Another popular product is a facial mask that combines these botanicals to provide a comprehensive treatment for dull, uneven skin tone, and premature aging⁴². These combined applications ensure that users benefit from the full spectrum of both ingredients' properties.

Therapeutic Uses: Potential Benefits in Treating Specific Skin Conditions When Used Together

The combined use of marigold and dragon fruit has significant potential in treating specific skin conditions. For instance, their synergistic anti-inflammatory and antioxidant properties make them ideal for addressing conditions such as acne, rosacea, and eczema. Marigold's ability to reduce inflammation and its antimicrobial effects can help manage acne outbreaks, while dragon fruit's vitamin C content supports skin repair and reduces hyperpigmentation⁴³.

In the case of rosacea, the soothing properties of marigold can alleviate redness and irritation, while dragon fruit's hydrating and antioxidant effects help restore skin barrier function and improve overall skin resilience. For eczema, the combination of marigold's skin-healing compounds and dragon fruit's moisturizing benefits can help soothe dry, itchy skin and enhance repair processes⁴⁴.

Overall, the synergistic effects of marigold and dragon fruit offer a powerful and versatile approach to skincare⁴⁵, combining their strengths to address a wide range of skin issues more effectively than either ingredient alone.

CONCLUSION

This review highlights the considerable potential of combining marigold and dragon fruit in beauty applications. Marigold's anti-inflammatory, antioxidant, and skin-healing properties, paired with dragon fruit's rich vitamin C content, hydration, and antioxidant benefits, create a powerful synergy that enhances their individual effects. The complementary phytochemicals from both botanicals work together to provide comprehensive skincare benefits, including improved skin hydration, reduced inflammation, and enhanced antioxidant protection.

Incorporating these ingredients into cosmetic formulations can offer multifaceted solutions for various skin concerns such as aging, acne, and irritation. The improved bioavailability of their active compounds when used together further boosts their effectiveness. However, to fully harness their potential, ongoing research is essential. Future studies should focus on optimizing extraction methods, understanding the interactions between these botanicals, and validating their efficacy through clinical trials. This will ensure that the combined use of marigold and dragon fruit not only meets cosmetic claims but also provides measurable, long-term benefits to skincare.

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